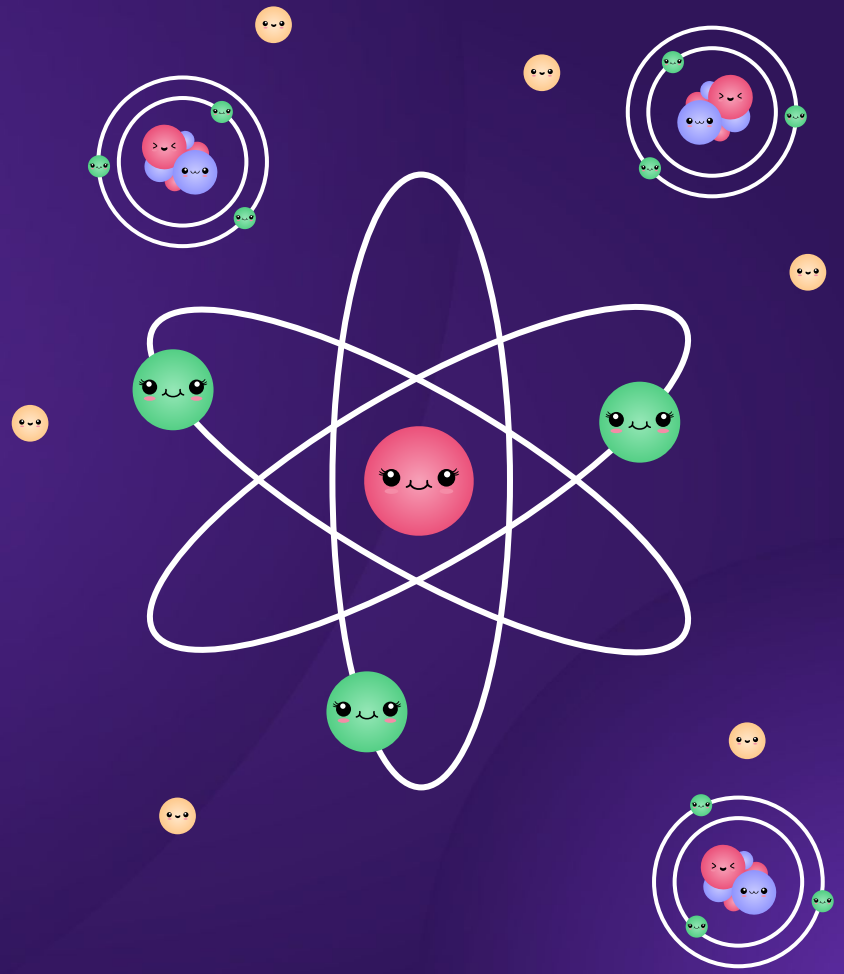
# Current Electricity: Voltage and Resistance

March 8, 2022



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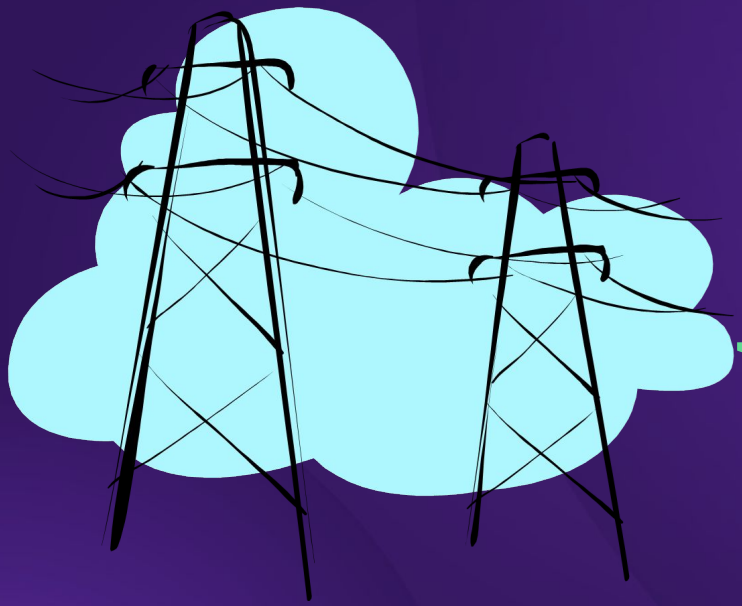
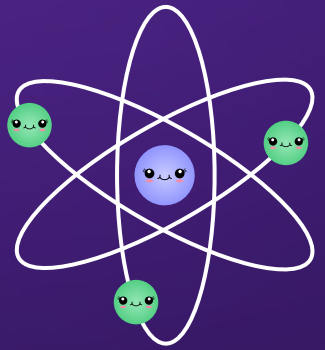


# 01

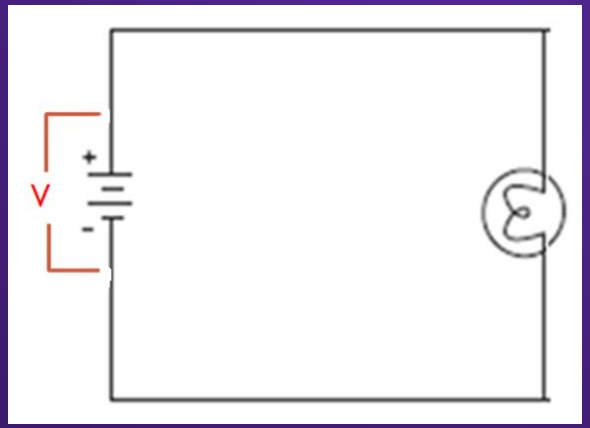
## Voltage



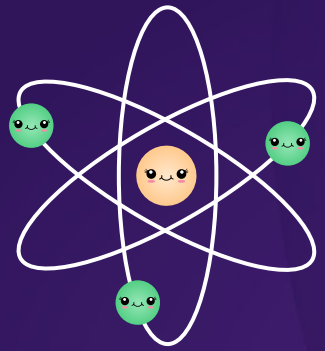
# What is Voltage (V)?

- Electrical energy is carried through a circuit by electrons.
- The change in electrical energy per coulomb of charge is called potential difference

# Potential Difference

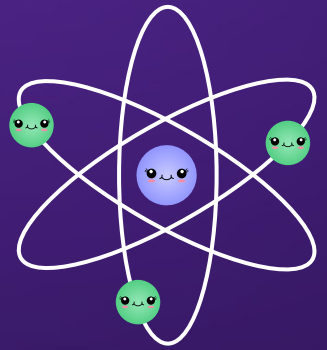



- When we hear difference what comes to mind?
  In a circuit, we can measure the change in potential energy between two different points on the circuit, and we call this potential difference, or voltage (V).



# 02

# Measuring Voltage



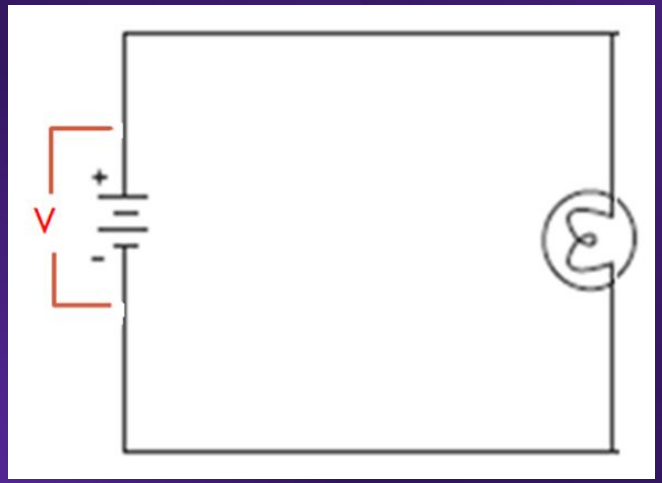
# Units of Voltage

- Potential difference is measured in Volts (named after the guy above)

- Because of its units Potential Difference is often just referred to as voltage (V)

# Measuring the Voltage

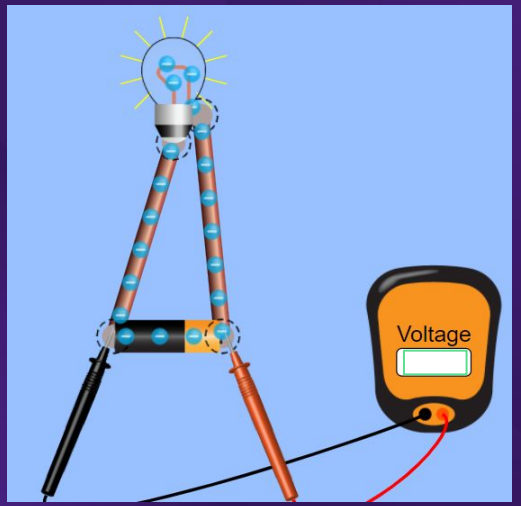
- Voltage is measured by a device called a voltmeter

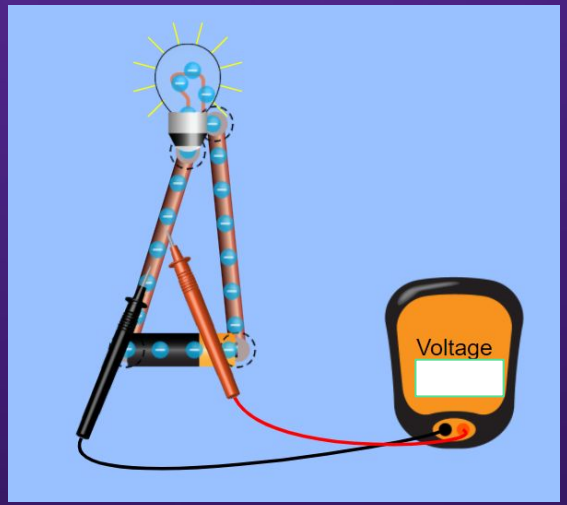




The voltmeter is always connected across the device
Reminder: this is to measure the difference between 2 points

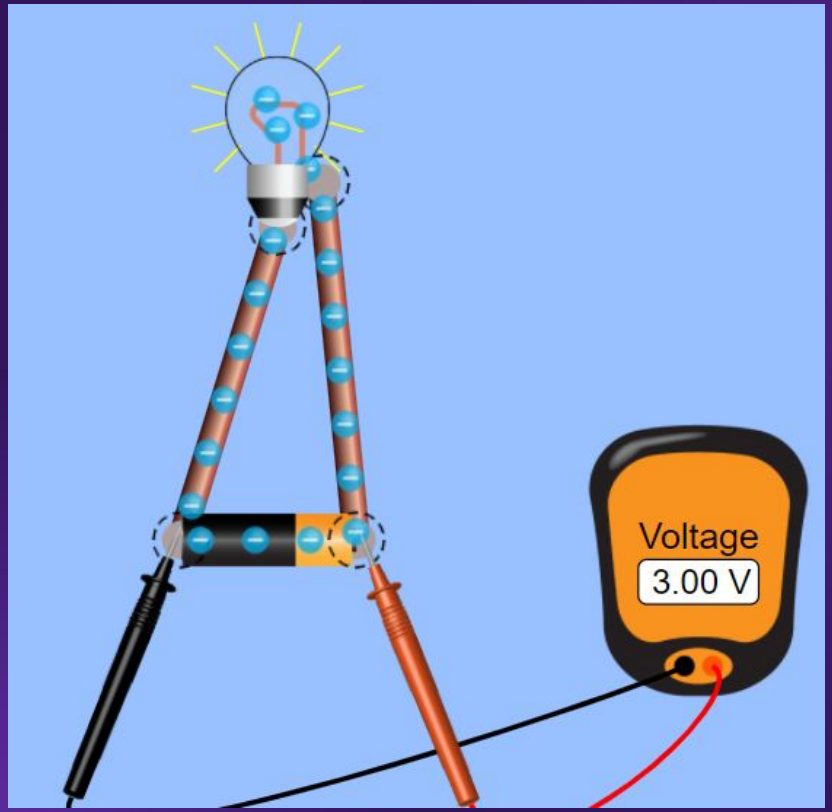
# Check Your Understanding

Which of following will give a non-zero potential difference reading?



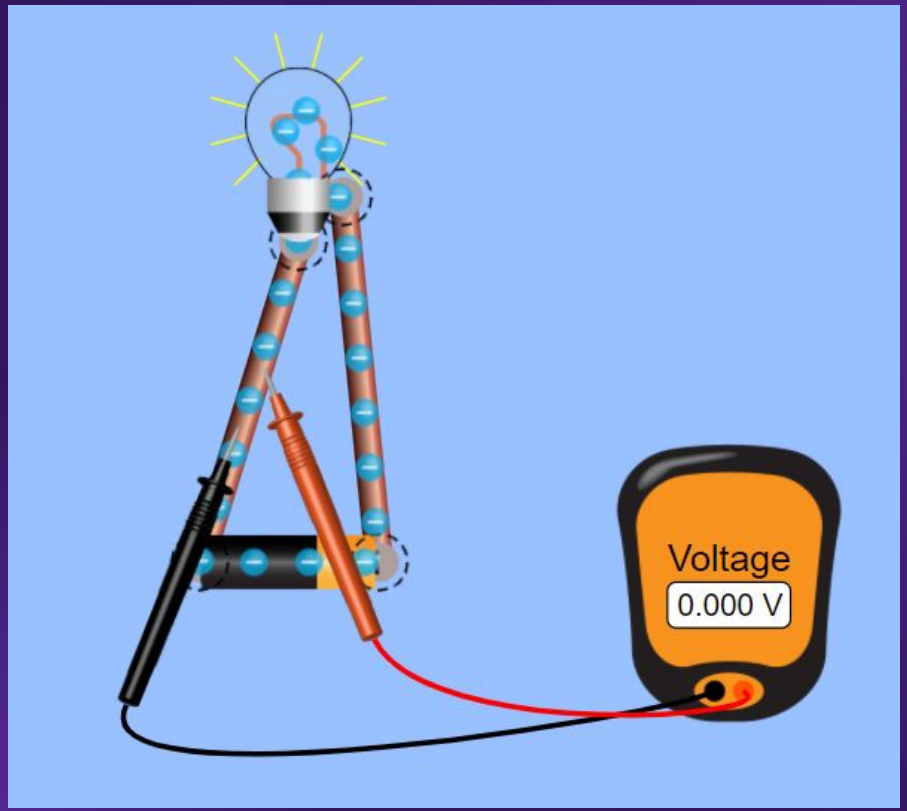



# Examples...



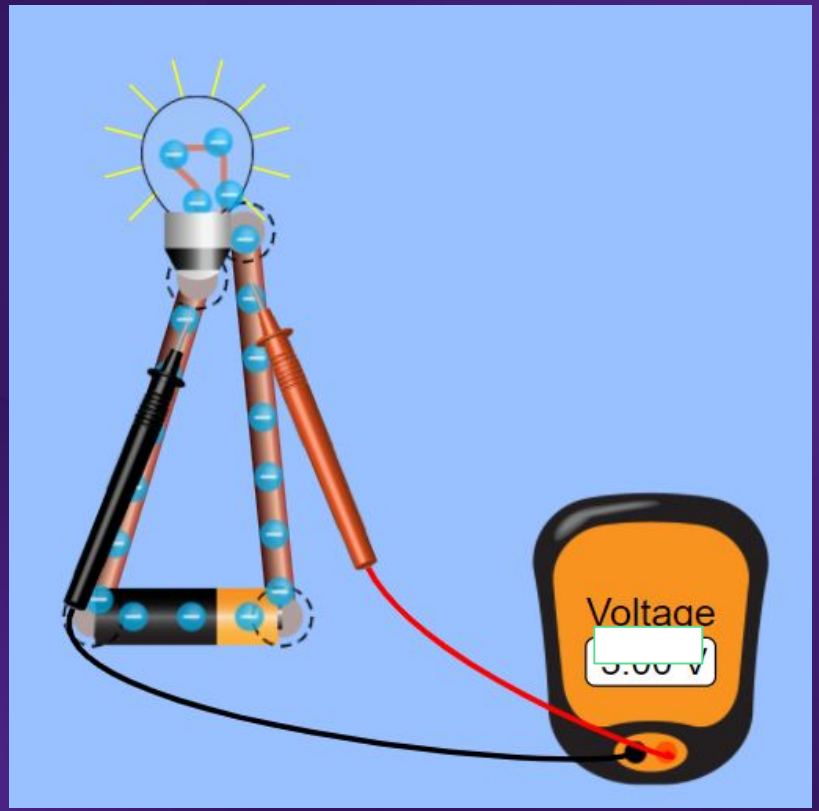

- When the Voltmeter hugs the battery we can measure the change in energy from the start to the end of the circuit

# Examples...

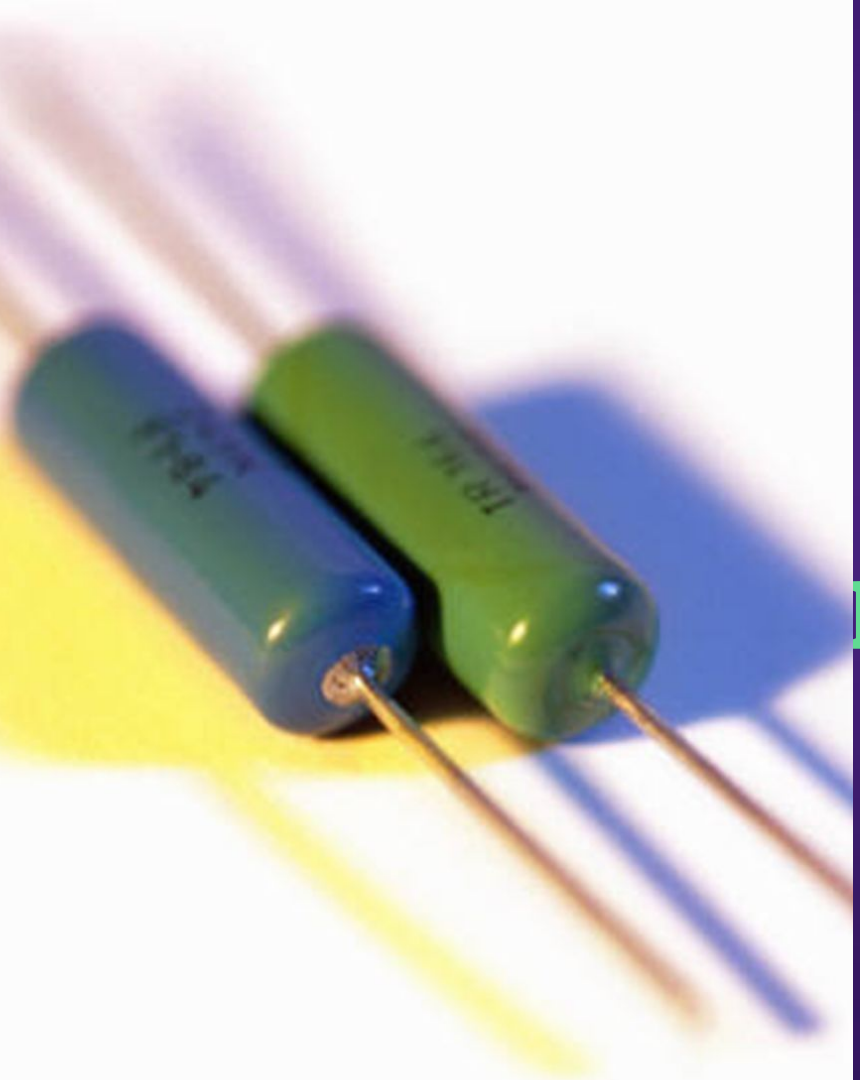



- When the Voltmeter is placed into a single point in the circuit no change in energy is detected

# Examples...




- When the Voltmeter hugs the bulb  we can measure the energy dissipated by the bulb

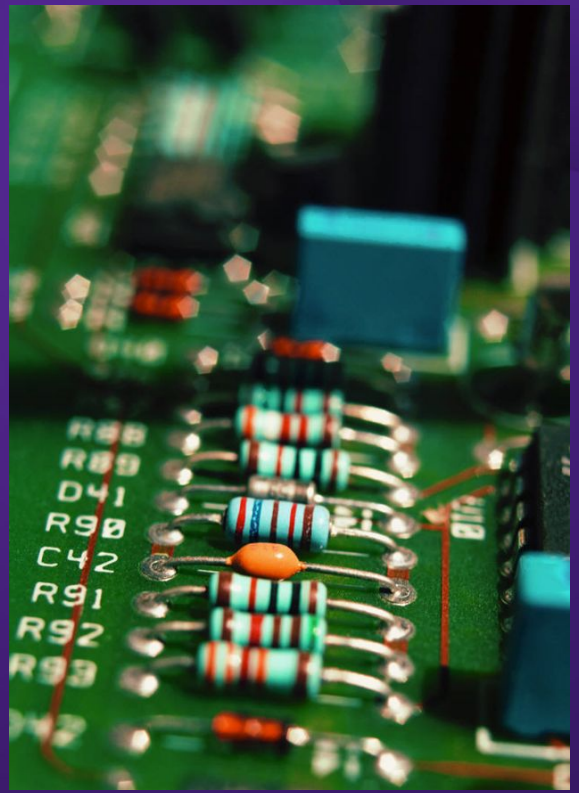


# 03

## Defining Resistance

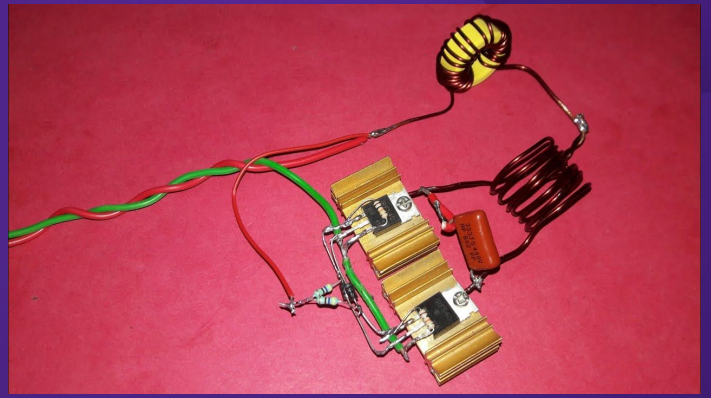
# The Resistor

- A resistor is part of an electric circuit that resists the flow of electric current.
- As current flows through a resistor, some of the electrical energy is transformed into another form, such as light or heat energy.



# Resistors in a circuit

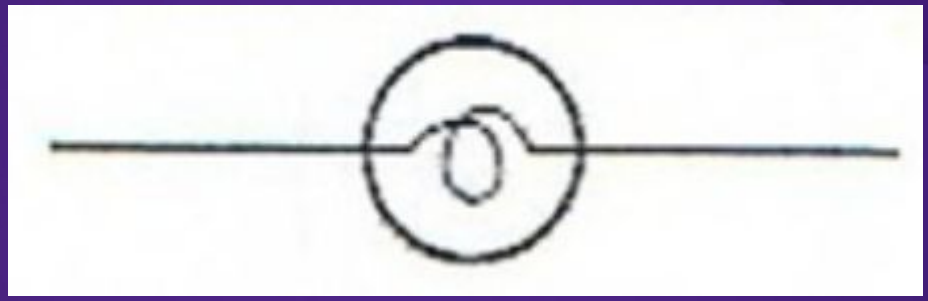
The symbol for a simple resistor is:



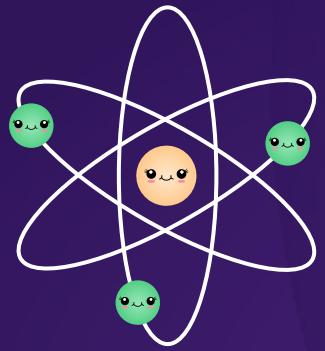
But… Many other components of circuits such as bulbs or heaters are also resistors and they get their own special symbols

# Resistors Resist Current

When a resistor is connected to an electric cell, the amount of **current** that flows through the circuit depends on **the amount of resistance**

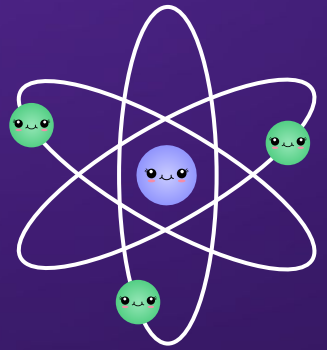


A bulb is a special type of resistor where some of the current gets converted/used as “light” energy!



# 04

# Resistance Values



# Units

Resistance is measured by an ohmmeter in units called Ohms with the symbol Ω (it's a greek letter called Omega)

# Resistors are colour coded

| | |
|---|---|
| black | 0 |
| brown | 1 |
| red | 2 |
| orange | 3 |
| yellow | 4 |
| green | 5 |
| blue | 6 |
| violet | 7 |
| grey | 8 |
| white | 9 |

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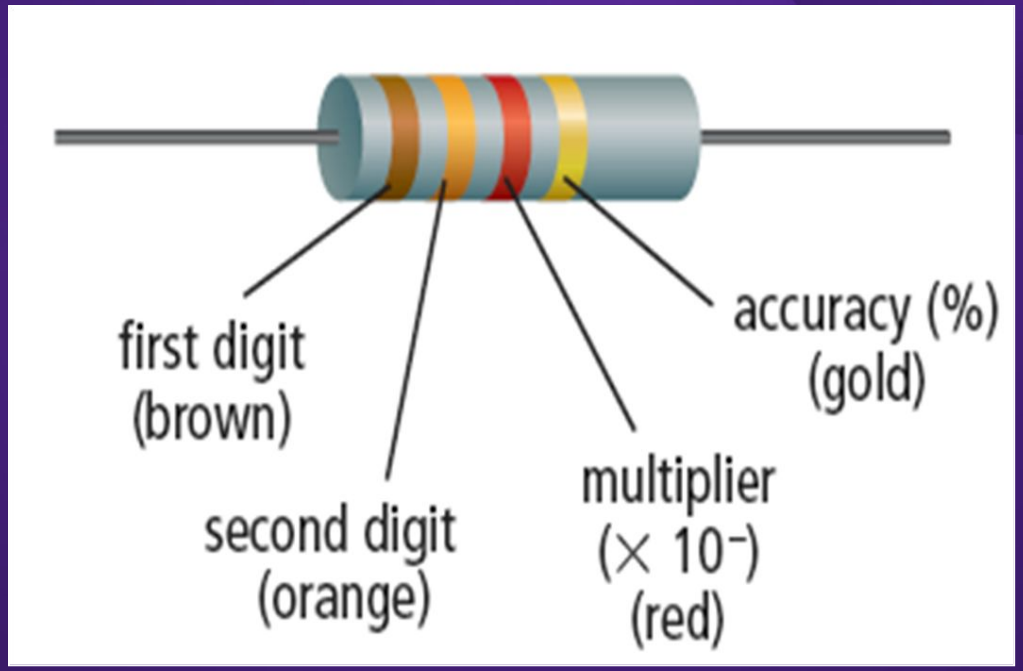



This example has a value of

$13 \times 10^{2}\ \Omega = 1300\ \Omega$

# Check your Understanding

Which of the following describes resistance?

| | |
|---|---|
| I. | It resists the flow of electrons. |
| II. | It speeds up the current flow in a circuit. |
| III. | It causes the electron's electrical energy to be converted to heat and light energy. |

**A.** I and II only

**B.** I and III only

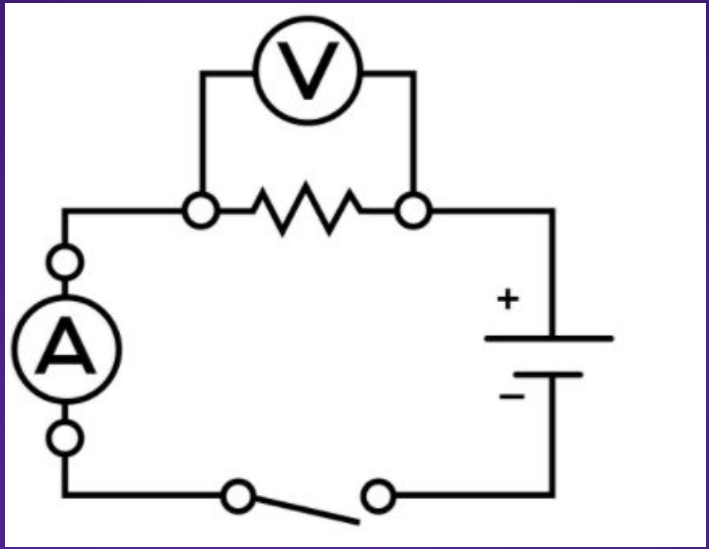
**C.** II and III only

**D.** I, II, and III

# Check your Understanding

Which of the following correctly matches the devices with what they measure?

| | Ammeter | Ohmmeter | Voltmeter |
|---|---|---|---|
| A. | current | voltage | resistance |
| B. | resistance | current | voltage |
| C. | voltage | resistance | current |
| D. | current | resistance | voltage |




# Lab Time